this key Professor Campbell proceeds to read the inscriptions. It is too soon to say a word about the merit of this work, and we shall wait with considerable impatience for the volume, explaining more thoroughly the method.

MICROSCOPY.[1]

THOMA'S SLIDING MICROTOME, IMBEDDING METHODS *(Continued from p. 998)*.—Professor Thoma adds to his description of his microtome some remarks on the imbedding methods more generally used. The method of treating tissues with gum arabic, first brought into use by Rindfleisch and Ranvier, is now very generally known and practiced. The same may be said of the method of cutting sections between two pieces of elder pith or hardened liver, &c. These in certain conditions are very useful and simple, but other methods of imbedding of more recent date give sections of the utmost perfection and unsurpassed delicacy.

The method of imbedding in emulsions containing fat and albumen originated with Bunge, and was subsequently modified by Calberla and Ruge. The following is very nearly the formula of the latter: The albumen and yelk of several hen's eggs is placed in a porcelain mortar and well stirred until it forms a thin yellow fluid, a result generally obtained in a few minutes. This fluid is subsequently passed through thin linen in order to remove the remaining membranaceous fragments. The specimen previously hardened in alcohol is then fixed by pins in a paper box and covered with the fluid. The preparation cannot, however, be immersed directly in alcohol for the purpose of hardening. It must be first hardened by alcohol steam, taking care never to raise the temperature of the steam above 30° C. For this purpose Professor Thoma uses a simple apparatus represented in Fig. 6.

A shallow water-bath, *a*, stands on an iron tripod, *b b b*, and is heated by a small flame, *c*. The water-bath is covered by a thin plate, *d d*. Upon this plate is a small glass vessel, *e*, filled with common alcohol and covered with a perforated disk of tin, *f f*. On this disk are placed the paper boxes, *g g*, containing the specimens and the imbedding fluid. The latter and the alcohol vessel are again separated from the external air by a glass cover, *h*. This apparatus, slightly heated, will harden the imbedding masses within a few days, after which time they are removed and subsequently fully hardened in a bottle

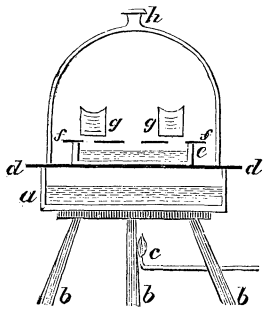

FIG. 6.—Apparatus for hardening egg-emulsion.

[1] Edited by Dr. C. O. WHITMAN, Newton Highlands, Mass.

containing ordinary alcohol. The latter process determines the degree of consistence of the imbedding mass. It can be made extremely hard by repeated use of strong alcohol. After a few trials it will be easy to find the convenient degree of consistence for each specimen.

If the temperature of the alcohol steam is more elevated, it will be found that the imbedding mass, instead of shrinking, will appear to increase in volume, innumerable air-bubbles developing in the emulsion. This can be easily avoided by using lower temperatures. Another danger, however, exists in the holes which the pins make in the walls of the paper boxes. The emulsion, before hardening, is so very liquid that it will pass through the smallest opening; this renders it necessary not to withdraw any of the pins from the sides of the paper box, and to use boxes without any openings. It will be found that this mass adapts itself perfectly to all surfaces of the specimens without penetrating into their interior structure, and that it can be cut admirably at all thicknesses down to $0.003^{mm.}$ Another very agreeable quality results from the fact that the newly prepared emulsion will adapt itself readily to hardened pieces. This enables us to spread out fine membranes on pieces of the hardened imbedding mass, and subsequently to imbed both in the way just described.

After this praise of the egg-emulsion, it will be just to mention a property which is occasionally disagreeable. It cannot be easily detached from the sections, and we have no means of dissolving it in media which do not injure the objects. The mass also colors in all the staining fluids generally used, and therefore becomes very visible in the preparations. The latter inconvenience should in all cases be avoided by coloring the specimen *in toto* before imbedding. For this purpose the fluids of Grenacher,[1] and especially alum-carmine, may be recommended. The imbedding mass remains nearly absolutely colorless if the specimen, after staining and before imbedding, is hardened again in alcohol.

Very elegant results may also be obtained by an imbedding mass originally invented by Duval and recently much improved by Merkel and Schiefferdecker.[2] This is collodion, or, preferably, a solution of so-called *celloidin.* If this substance cannot in general be cut to such extreme delicacy as the albuminous mass just described, it has a great advantage in being extremely pellucid. The original communication of the last-named author is easily accessible, so that Professor Thoma considers it is superfluous to give a detailed account of it, but adds a few remarks on his own experience with it.

According to the formula of Schiefferdecker, the imbedding

[1] Arch. f. Mikr. Anat., XVI (1879), p. 465.
[2] Arch. f. Anat. u. Physiol. (Anat. Abtheil.). 1882.

fluid consists of a concentrated solution of celloidin in a mixture of equal parts of absolute alcohol and ether. The specimen is soaked successively in absolute alcohol and ether, and in the imbedding fluid. This requires at least several days. After this time the imbedding proper may be undertaken, and for this we have the choice of two methods.

The even surface of a cork is covered with a thick solution of celloidin, so as to form, by evaporation, a strong collodion membrane on the cork. Upon this is put the specimen, covered layer by layer with fresh quantities of the solution of celloidin, each being allowed to dry only partially. When the object is thoroughly covered we immerse it in alcohol of 0.842 sp. gr. In twenty-four hours the whole is ready for cutting.

The other method makes use of little paper boxes for the imbedding. The specimen, soaked in celloidin solution, is fixed in the box by pins, and the box filled with celloidin. The preparation is then placed on a flat piece of glass and covered with a glass cover which does not exactly fit the glass plate. In a few days the ether will have evaporated gently and slowly from the imbedding mass, and the latter will shrink a little. If necessary further celloidin solution can be poured in the paper box to fill it again. It is only necessary to moisten the surface of the first mass with a drop of ether in order to allow of a perfect junction between the old and the new layers. The preparation is again exposed to slow evaporation below the glass cover, and a few days later the imbedding mass will be consolidated to an opaline body, whose consistency can well be compared to that of the albumen of a boiled egg. The walls of the paper box can now be removed, and the imbedding mass placed in very dilute alcohol, which will, in a very few days, produce a proper degree of consistency to admit of cutting.

This method differs in some degree from that which Schiefferdecker gives for imbedding in paper boxes. As other observers have remarked, his method frequently gives rise to a great number of air-bubbles in the imbedding mass. Consequent upon the altered manipulations of Professor Thoma, we have to adapt the imbedded specimen to a cork for the purpose of cutting. This may be done in the following way: The even surface of the cork is covered by a thick layer of celloidin solution. This is allowed to dry up perfectly, so as to produce a hard membrane of celloidin. This is again covered with further celloidin solution. In the meantime the lower surface of the imbedding mass is cut even and washed with absolute alcohol, and subsequently moistened with a drop of ether. This moist surface is adapted to the stratum of liquid celloidin on the cork, and exposed for a few minutes to the open air. After this the whole is placed in dilute alcohol, which in a few hours will unite the imbedding-mass solidly with the cork.

In a great number of cases it may be regarded as a great advantage of the celloidin that it penetrates the tissues thoroughly and yet remains pellucid, so as to be more or less invisible in the specimen. This quality can be made use of in another direction for the purpose of soaking specimens which are too brittle to be cut after hardening alone. We may make use of celloidin in a similar way to the gum arabic mentioned above. The minute normal and pathological anatomy of the lung in particular will derive great advantage from such a proceeding. Indeed, we are not able to get a perfect idea of the changes produced by pneumonia if we do not by this method or by the following (with paraffine) prevent the loss of a great part of the exuded substances which in this disease lie loose in the alveolar cavities. The study also of micro-organisms in the lung will derive great benefit from the celloidin method, and it will be very welcome to many to know that the tissues imbedded in celloidin may be stained with the different fluids, ammonium-carmine, alum-carmine, borax-carmine, hæmatoxylin, analine colors and various others. The reaction of acids and alkalies, particularly acetic acid and solution of potash is, moreover, not interfered with. And further, we are able to color the object before imbedding with all staining fluids which are not soluble, or only little soluble, in alcohol and ether.

After staining and cutting the sections may be mounted in glycerine and various other fluids. Mounting in Canada balsam requires, however, some precautions on account of the chemical character of the celloidin. Absolute alcohol and oil of cloves should be avoided and replaced by alcohol of ninety-six per cent, and by oleum origani. This is, at least the advice of Schiefferdecker and Professor Thoma has had no occasion to be dissatisfied with the result.

The efforts of Bütschli and Blochmann[1] have given us another splendid-imbedding mass,[2] paraffine dissolved in chloroform, which admits of sections of the highest delicacy. Bütschli was able to cut, in this imbedding substance, small specimens down to 0.002$^{mm.}$ This method seems particularly adapted to researches in embryology and zoölogy where hitherto imbedding masses formed of paraffine and turpentine have been frequently used.

Usually it appears advisable to stain the specimens *in toto* before imbedding in paraffine and chloroform, and for this purpose Grenacher's alum-carmine and borax-carmine are very highly to be recommended. The long-known ammonium-carmine is also occasionally useful.

Dr. M. Schulgin,[3] in order to obviate the inconvenience that the same portion of the knife has always to be used, has had a

[1] Biol. Centralbl., I (1881), pp. 591-2. See this journal, II (1882), p. 708.
[2] The credit of introducing this mass belongs to Dr. Giesbrecht.
[3] Zool. Anzeig., VI (1883), p. 21.

knife of a somewhat different construction made (but which he does not explain). The advantage of this is that it can be moved along its whole length, so that different portions can be used for cutting.

Professor R. Kossmann writes:[1] "Many to whom the turning back of the micrometer-screw of the microtome is an annoying delay, will be thankful to me for pointing out to them that in two or three seconds it can be turned back its whole length by using a kind of fiddlebow, such as is used for drilling holes. The loop of the bow-string (made of strong silk cord, waxed or rosined) is passed round the smooth neck of the screw, and the bow is moved alternately to the left with stretched, and to the right with slackened cord."—*Journ. Roy. Microscopical Society, iii, 298.*

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SCIENTIFIC NEWS.

— The new antiseptic, boro-glyceride, may furnish us with another preservative. From an utter absence of smell, taste (except a slightly sweet one) and innocuous qualities, it has been suggested that fresh fish preserved by it may be sent long distances in good condition. The boro-glyceride should be mixed with many times its bulk of warm water, and cloths wet with the solution should be put in and wrapped around the eviscerated fish. This is certainly a good field for experiment.—*Scientific and Literary Gossip.*

— Mr. John Young, at a recent meeting of the Glasgow Natural History Society, gave some interesting facts in connection with *Callianassa turneriana*, a macrurous crustacean found on the west coast of Africa. It is said to occur periodically once in four or seven years in large numbers. "With the natives of the Cameroons it forms part of the dowry of a woman at marriage, and should divorce be necessary, the shrimp must also be returned; but not being always obtainable, there is room enough for a good African quarrel among the natives." — *Scientific and Literary Gossip.*

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PROCEEDINGS OF SCIENTIFIC SOCIETIES.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Minneapolis, Aug. 15–21, 1883.—The attendance on the meeting was rather small, but 300 members participating.

Professor Hunt, of Montreal, for the committee on international congress of geologists, reported that it had held a meeting and had considered two subjects—uniform geological nomenclature and geological cartography. On the first subject it was reported that the committee had conferred with Maj. Powell, director of

[1] Ibid.